

# CLAIMS

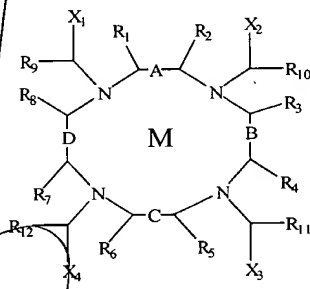
We claim:

1. An MRI agent comprising:

- a) a Gd(III) ion bound to a chelator such that said Gd(III) ion has coordination atoms in at least 5 coordination sites of said Gd(III) ion;
- b) a blocking moiety covalently attached to said chelator which hinders the rapid exchange of water in the remaining coordination sites;

wherein said blocking moiety is capable of interacting with a target substance such that the exchange of water in the remaining coordination sites is increased.

2. An MRI agent having the formula:



wherein

M is a paramagnetic metal ion selected from the group consisting of Gd(III), Fe(III), Mn(II), Yt(III), Cr(III) and Dy(III);

A, B, C and D are either single bonds or double bonds;

X<sub>1</sub>, X<sub>2</sub>, X<sub>3</sub> and X<sub>4</sub> are -OH, -COO-, -CH<sub>2</sub>OH -CH<sub>2</sub>COO-, or a blocking moiety;

R<sub>1</sub> - R<sub>12</sub> are hydrogen, alkyl, aryl, phosphorus moiety, or a blocking moiety;

wherein at least one of X<sub>1</sub>-X<sub>4</sub> and R<sub>1</sub> - R<sub>12</sub> is a blocking moiety.

3. An MRI agent comprising:

- a) at least a first paramagnetic metal ion bound to a first complex, said first complex comprising:
  - i) a first chelator; and
  - ii) a blocking moiety covalently attached to said first chelator which binds in at least a first coordination site of said first metal ion and which is capable of interacting with a target substance such that the exchange of water in at least said first coordination site of said first metal ion is increased; and
- b) at least a second paramagnetic metal ion bound to a second complex, said second complex comprising:

- i) a second chelator; and  
ii) a blocking moiety covalently attached to said second chelator which binds in at least a first coordination site of said second metal ion and which is capable of interacting with a target substance such that the exchange of water in at least said first coordination site of said second metal ion is increased.

4. An MRI agent comprising at least a first MRI duplex moiety comprising:  
a) a first chelator comprising a first paramagnetic metal ion;  
b) a second chelator comprising a second paramagnetic metal ion;  
c) a blocking moiety covalently attached to at least one of said first or said second chelators, said blocking moiety providing at least a first coordination atom of each of said first and said second metal ions and which is capable of interacting with a target substance such that the exchange of water in at least a first coordination site in at least one of said metal ions is increased.

5. A composition comprising a polymer comprising at least one covalently linked MRI contrast agent comprising a paramagnetic metal ion bound to a complex, said complex comprising:

- a) a chelator; and  
b) a blocking moiety covalently attached to said chelator which binds in at least a first coordination site of said metal ion and which is capable of interacting with a target substance such that the exchange of water in at least said first coordination site is increased.

6. A MRI agent comprising a paramagnetic metal ion bound to a complex, said complex comprising:

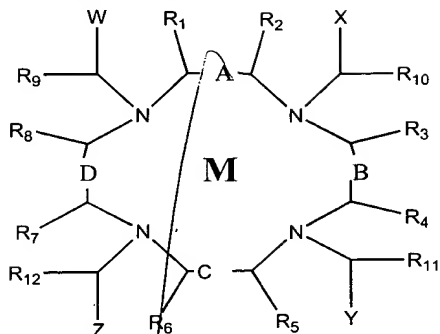
- a) a chelator; and  
b) a blocking moiety covalently attached to said chelator which binds in at least a first coordination site of said metal ion and which is capable of interacting with a target substance such that the exchange of water in at least said first coordination site is increased.

7. A MRI agent comprising

- a) a paramagnetic metal ion capable of binding  $n$  coordination atoms, wherein said metal ion is bound to a chelator such that said metal ion has coordination atoms at  $(n-1)$  or  $(n-2)$  coordination sites of said metal ion; and  
b) a blocking moiety covalently attached to said chelator that hinders the rapid exchange of water in the remaining coordination site or sites,

wherein said blocking moiety is capable of interacting with a target substance, such that the exchange of water at the remaining coordination site or sites is increased.

8. A MRI agent having the formula comprising:



wherein

M is a paramagnetic metal ion selected from the group consisting of Gd(III), Fe(III), Mn(II), Yt(III), Cr(III) and Dy(III);

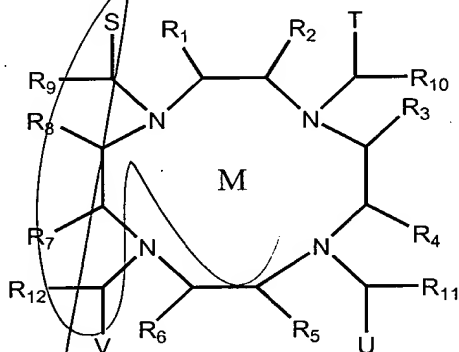
A, B, C and D are either single bonds or double bonds;

W, X, Y and Z are -OH, -COO-, -CH<sub>2</sub>OH or -CH<sub>2</sub>COO-;

R<sub>1</sub> - R<sub>12</sub> are hydrogen, alkyl, substituted alkyl, phosphorus moiety, or a blocking moiety;

wherein at least one of R<sub>1</sub> - R<sub>12</sub> is a blocking moiety.

9. A MRI agent having the formula comprising:



wherein

M is a paramagnetic metal ion selected from the group consisting of Gd(III), Fe(III), Mn(II), Yt(III), Cr(III) and Dy(III);

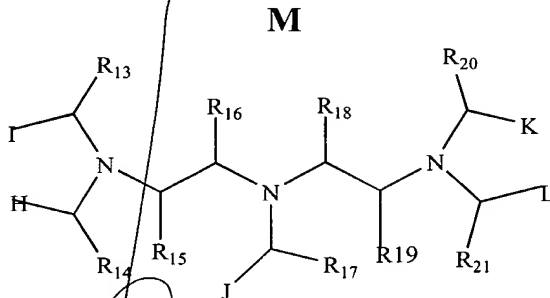
A, B, C, and D are either single or double bonds;

S, T, U and V are -OH, -COO-, -CH<sub>2</sub>OH, -CH<sub>2</sub>COO-, or a blocking moiety;

R<sub>1</sub> - R<sub>12</sub> are hydrogen, alkyl, substituted alkyl, or phosphorus moiety;

wherein at least one of S, T, U or V is a blocking moiety.

10. A MRI agent having the formula comprising:



wherein

M is a paramagnetic metal ion selected from the group consisting of Gd(III), Fe(III), Mn(II), Yt(III), Cr(III) or Dy(III);

H, I, J, K and L are -OH, -COO-, -CH2OH, -CH2COO-, or a blocking moiety;

R<sub>13</sub> - R<sub>21</sub> are hydrogen, alkyl, substituted alkyl, phosphorus moiety or a blocking moiety;

wherein at least one of R<sub>13</sub> - R<sub>21</sub>, H, I, J, K or L is a blocking moiety.

11. A method of magnetic resonance imaging of a cell, tissue or patient comprising administering an MRI agent according to claim 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10 to a cell, tissue or patient and rendering a magnetic resonance image of said cell, tissue or patient.